

# Independent Verification of 10 $\mu$ L Dispensed Volumes Using the AVENTIX Scarlett™ 01 Volume Analysis System

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## Overview

The AVENTIX Scarlett™ 01 Volume Analysis System is a patent pending technology that enables rapid, non-contact measurement of liquid volumes dispensed into microplates, supporting independent verification of liquid handling performance in laboratory workflows.

Accurate verification of microliter dispensing is essential for pharmaceutical screening, compound management, and assay development workflows, where liquid handling performance directly impacts experimental reproducibility and data quality.

An independent validation study conducted with VTT MIKES, the National Metrology Institute of Finland, evaluated the ability of the Scarlett system to measure 10  $\mu$ L dispensed volumes of DMSO in a 384-well microplate.

## Independent Third-Party Validation

The objective was to assess whether Scarlett measurements of a 10  $\mu\text{L}$  dispense were within  $\pm 5\%$  of the calibrated dispensed volume delivered using a traceably calibrated syringe.

Testing was conducted using a Greiner Bio-One 384-well microplate (PN: 781101) according to a protocol defined by a pharmaceutical customer and overseen by VTT MIKES. VTT MIKES is the National Metrology Institute of Finland and participates in the international metrology infrastructure responsible for maintaining and disseminating SI traceability.

DMSO was dispensed using a Hamilton 10  $\mu\text{L}$  801RN glass syringe (PN: 84853) equipped with a Chaney Adapter kit (PN: 32146) to ensure highly reproducible manual dispensing.

The syringe was gravimetrically calibrated by RISE Research Institutes of Sweden, the Swedish National Metrology Institute, according to ISO 8655 methods.

The calibrated dispensed volume used in the evaluation was  $10.12 \mu\text{L} \pm 0.07 \mu\text{L}$  (95% confidence).

## Measurement Method

Scarlett determines liquid volume by optically measuring the liquid height within each microplate well and converting the measured

liquid height and meniscus profile into a calculated volume based on a calibration curve for the liquid/plate combination.

In the validation experiment, six wells in each of three separate rows (B, I, and P;  $n = 18$ ) were filled with approximately 50  $\mu\text{L}$  of Vaseline oil, and the initial well volumes were measured.

A calibrated Hamilton syringe was then used to dispense 10  $\mu\text{L}$  of DMSO into the Vaseline oil. The wells were measured again, and the dispensed DMSO volume was determined as the difference between the measured volume before and after the 10  $\mu\text{L}$  syringe dispense.

## Key Results

Measured DMSO dispensed volumes across the microplate are summarized below.

Plate Row	n	Mean Measured Volume ( $\mu\text{L}$ )	Relative Error	Statement of Conformity
<b>B</b>	6	10.10	-0.2%	<b>PASS</b>
<b>I</b>	6	10.35	2.3%	<b>PASS</b>
<b>P</b>	6	10.39	2.7%	<b>PASS</b>

All measured values were within  $\pm 5\%$  of the calibrated dispensed volume, consistent with acceptance criteria commonly applied in microliter liquid handling verification. Individual measurements are shown in Figure 1. The results demonstrate agreement between Scarlett measurements and the SI-traceable calibrated syringe volume across multiple plate locations.

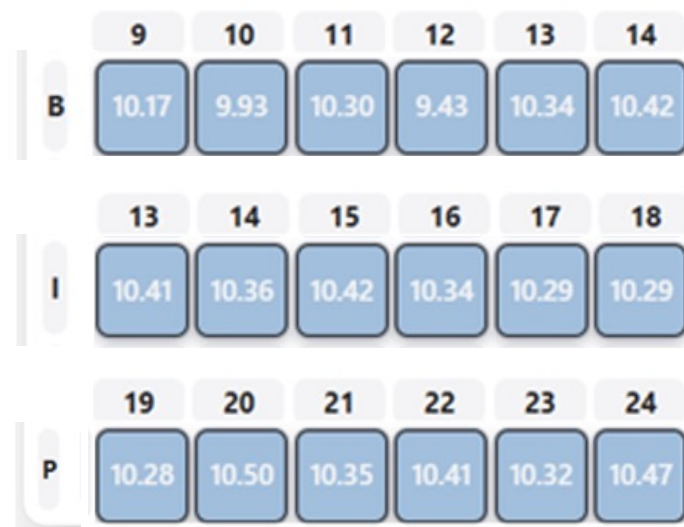


Figure 1. Final measured DMSO volumes ( $\mu\text{L}$ ) calculated as the difference between the measured well volumes before and after dispensing 10  $\mu\text{L}$  onto approximately 50  $\mu\text{L}$  of Vaseline oil. This image shows the calculated volumes for the wells tested in the evaluation.

## Benefits

The Scarlett 01 Volume Analysis System provides many benefits as shown in Figure 2.

### Non-contact Liquid Volume Measurement



Non-contact measurement of liquid volumes



Rapid verification of dispensing accuracy in microplates



Compatible with common solvents such as DMSO



Suitable for high-throughput screening environments

Figure 2. Benefits of the Scarlett 01 Volume Analysis System.

- Non-contact measurement of liquid volumes
- Rapid verification of dispensing performance in microplates
- Compatible with common solvents, including DMSO
- Suitable for high-throughput screening environments
- Enables independent verification of liquid handling performance

## Conclusion

Independent validation performed by VTT MIKES, the National Metrology Institute of Finland, demonstrates that the AVENTIX Scarlett™ 01 Volume Analysis System can accurately verify 10  $\mu\text{L}$  dispensed volumes of DMSO in 384-well microplates.

Measured dispense volumes ranged from -0.2%–2.7% from the calibrated syringe volume of 10.12  $\mu\text{L}$ , remaining well within the  $\pm 5\%$  acceptance criterion defined in the validation protocol.

These results demonstrate that the Scarlett system provides a reliable method for independent verification of microliter-scale liquid dispensing performance in microplate-based laboratory workflows.

A complete technical description of this evaluation study can be found in Application Note AN-001- *Measurement of 10  $\mu\text{L}$  DMSO Dispensed Volumes in Microplates Using the AVENTIX Scarlett™ 01 System.*



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